

REMARKS

Claims 1-12 and 14 are pending. Claim 13 has been canceled. Claim 14 is newly added

Applicants have amended the claims on the various informalities noted by the Examiner.

Claims 1-5, 7, 9 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tani et al. (JP 10-231317) in view of Badley et al. (US 5,576,263). Claims 1-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Koehn et al. (Abstr. ACS, 1997) in view of Badley et al. (US 5,576,263). Applicants respectfully traverse these rejections.

The Examiner acknowledges that Tani et al. does not disclose the use of a supported catalyst system, but rather relies on Badley et al. for such teaching. However, Badley et al. uses a classic inorganic catalyst. With complexes of the type used in the instant application, there is always great uncertainty whether the ligands will stay attached when the complex is mixed with a support. Applicants enclose an excerpt from *Journal of Polymer Science* (Vol. 12, p. 1549) which explains that chromocene catalysts, for example, lose one of their rings when mixed with silica (introduction). These supported catalysts can be completely different and can have different polymerization behavior. In the triazacyclohexane complexes the triazacyclohexane ligand is more weakly bonded than the cyclopentadienyl ligand in the chromocene. Even when supported, these triazacyclohexane complexes, surprisingly, still show single site characteristics, high activity, and good polymerization behavior. Therefore,

MIHAN et al.

Serial No. 09/937,780

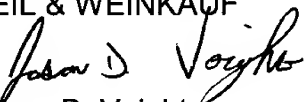
Badley et al. would not have motivated one of ordinary skill in the art to employ a support with the present catalyst systems.

The Examiner also acknowledges that Tani et al. does not teach copolymerization of olefins as claimed. Applicants urge that the copolymerization is less straightforward than the Examiner suggests. Table 5, Examples 53 and 54, of the instant application shows that the density does not change considerably when comparing homopolymerization with copolymerization. As shown in the enclosed diagram (Abb. 13, *Ullmann*, 4th Ed., Vol. 19, p. 187), this is quite unusual since the density is generally reduced when comonomer is incorporated. In the present invention, one can only spot the comonomer incorporation in the change of viscosity (Eta value). Thus, the cited art would not have led one having ordinary skill in the art to conclude that the present catalyst system would have been suitable for copolymerization reactions.

**Please find attached a check for \$400.00 for a two month extension of time fee.**

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11.0345. Please credit any excess fees to such deposit account.

Respectfully submitted,  
KEIL & WEINKAUF

  
Jason D. Voight  
Reg. No. 42,205

1350 Connecticut Avenue, N.W.

MIHAN et al.

Serial No. 09/937,780

Washington, D.C. 20036

(202) 659-0100

JDV/mks

**COMPLETE LISTING OF ALL CLAIMS**

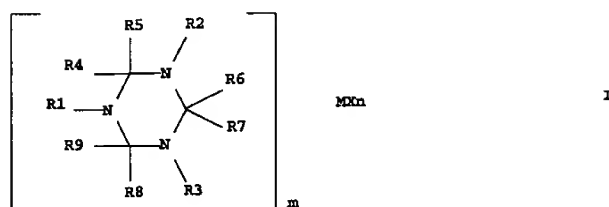
1.(currently amended) A process for copolymerizing ethylene or propylene with one another or with other olefinically unsaturated compounds, which comprises carrying out in the polymerization in the presence of a catalyst system which comprises the following components:

- A) a complex of a transition metal with one or two substituted or unsubstituted 1,3,5-triazacyclohexane ligands and
- B) if desired one or more activator compounds.

B<sup>1</sup> 2.(currently amended) A process for copolymerizing ethylene or propylene with one another or with other olefinically unsaturated compounds at from 20 to 300°C under pressures from 5 to 4000 bar, which comprises the following steps:

- a) contacting a complex of a transition metal with one or two substituted or unsubstituted 1,3,5-triazacyclohexane ligands (A) with at least one activator compound (B),
- b) contacting the reaction product from step (a) with the olefinically unsaturated compounds under polymerization conditions.

3.(currently amended) A process as claimed in claim 1, wherein the component (A) is a compound of the formula I



in which:

M is a transition metal of groups 4 to 12 of the Periodic Table,

R<sup>1</sup>-R<sup>9</sup> are hydrogen or organosilicon or organic substituents having from 1 to 30 C atoms, it being possible for two geminal or vicinal radicals R<sup>1</sup> to R<sup>9</sup> radicals also be connected to form a 5- or 6-membered ring, and it being possible, when m is 2, for an R<sup>1</sup>-R<sup>9</sup> radical of in each case one triazacyclohexane ring to form together with a substituents on the other triazacyclohexane ring a bridge between the two rings,

X is fluorine, chlorine, bromine, iodine, hydrogen, C<sub>1</sub>-C<sub>10</sub>-alkyl, C<sub>6</sub>-C<sub>15</sub>-aryl or alkylaryl having from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, trifluoroacetate, BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup> or bulky noncoordinating anions,

m is 1 or 2,

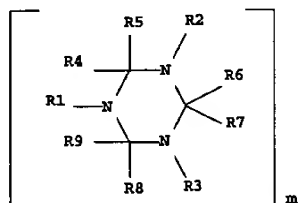
n is a number from 1 to 4 which corresponds to the oxidation state of the transition metal M.

4.(previously amended) A process as claimed in claim 1, wherein M is a transition metal of group 6 of the Periodic Table.

- 5.(previously amended) A process as claimed in claim 1, wherein mixtures of ethylene with C<sub>3</sub>-C<sub>8</sub>- $\alpha$ -olefins are employed as monomers.
- 6.(previously amended) A process as claimed in claim 1, wherein an aluminoxane is employed as activator compound (B).
- 7.(previously amended) A process as claimed in claim 1, wherein borane or borate having at least 2 substituted aryl radicals is employed as the activator compound (B).
- 8.(previously amended) A process as claimed in claim 3, wherein at least one of the radicals R<sup>1</sup>, R<sup>2</sup> or R<sup>3</sup> is different from the other radicals in this group.
- 9.(previously amended) A catalyst for polymerizing olefins, comprising at least one transition metal complex (A) as defined in claim 1 and a support material and, if desired, one or more activator compounds (B).
- 10.(original) A process for polymerizing or copolymerizing olefins wherein the polymerization or copolymerization is carried out in the presence of a catalyst as claimed in claim 9.

---

11.(currently amended) A transition metal complex of the formula I



in which:

M is a transition metal of groups 4 to 12 of the Periodic Table,

R<sup>1</sup>-R<sup>9</sup> are hydrogen or organosilicon or organic substituents having from 1 to 30

C atoms, it being possible for two geminal or vicinal radicals R<sup>1</sup> to R<sup>9</sup>

radicals also be connected to form a 5- or 6-membered ring, and it being

possible, when m is 2, for an R<sup>1</sup>-R<sup>9</sup> radical of in each case one

triazacyclohexane ring to form together with a substituents on the other

triazacyclohexane ring a bridge between the two rings,

B3 X is fluorine, chlorine, bromine, iodine, hydrogen, C<sub>1</sub>-C<sub>10</sub>-alkyl, C<sub>6</sub>-C<sub>15</sub>-aryl or alkylaryl having from 1 to 10 C atoms in the alkyl radical and from 6 to 20 C atoms in the aryl radical, trifluoroacetate, BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup> or bulky noncoordinating anions,

m is 1 or 2,

n is a number from 1 to 4 which corresponds to the oxidation state of the transition metal M,

wherein at least one of the radicals R<sup>1</sup>, R<sup>2</sup> or R<sup>3</sup> is different from the other radicals in this group.

12.(currently amended) A transition metal complex of the formula I as defined in claim 11, wherein m is 2 and one radical R<sup>1</sup>-R<sup>9</sup> of one triazacyclohexane ring together with one of these substituents of the other triazacyclohexane ring forms a bridge between the two rings.

13. (canceled)

14.(new) A process as claimed in claim 3, wherein m is 2 and one radical R<sup>1</sup>-R<sup>9</sup> of one triazacyclohexane ring together with one of these substituents of the other triazacyclohexane ring forms a bridge between the two rings.